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(71) Applicant
TLV Co. Ltd.,

(Incorporated in Japan),

881 Nagasuna, Noguchi-cho, Kakogawa-shi, Hyogo 675,
Japan

(72) Inventors
Yoshiyasu Fujiwara,
Masao Yonemura,
Takeshi Yokoyama

(74) Agent and/or Address for Service
Haseltine Lake & Co., Hazlitt House, 28 Southampton
Buildings, Chancery Lane, London WC2A 1AT

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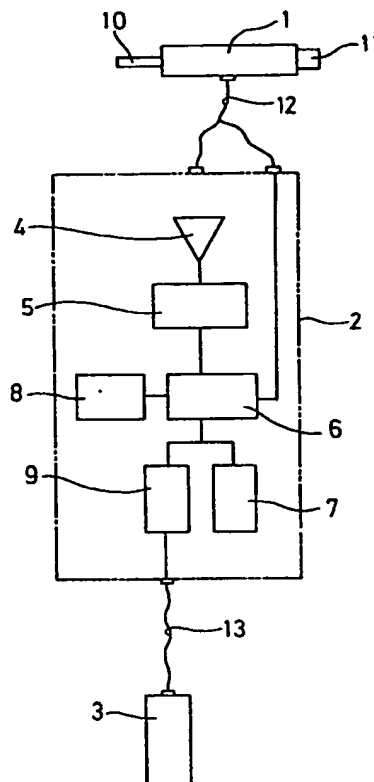
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None

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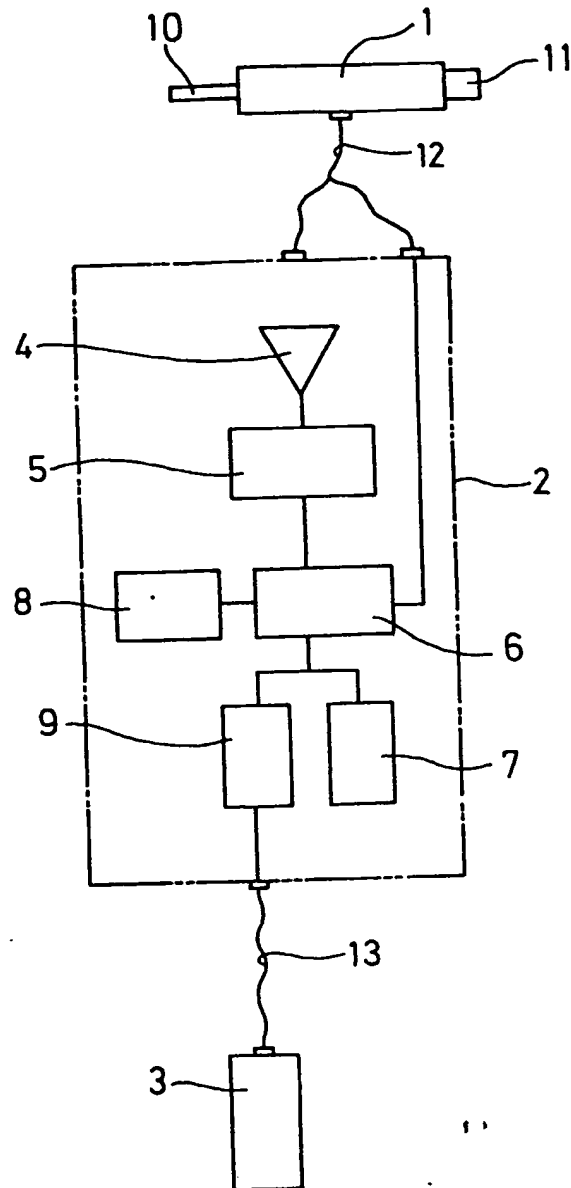
(54) Steam trap operation judging device

(57) To predict when a steam trap in a steam system employing a plurality of steam traps requires replacement or repair a detector 1 with a bar code reader 11 and leakage detector 10 reads the trap number and type and inputs it to microcomputer 6 and transmits a signal from leak detector 10 via amplifier 4 and A/D converter 5 to the microcomputer. The presence or absence of a leak is displayed at 7 and stored at 8 for each trap. When all traps have been interrogated the stored data is sent via transmitter sections 9 to a host computer 3 which records and displays the operation/leakage of each trap, the summation of the total leakage of all traps; the analysis of leakage in terms of cost or rejection rate, and the changes in leakage with time of each trap.

FIG.1



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FIG.1

SPECIFICATION

Steam trap operation judging device

5 This invention relates to a steam trap operation judging device which judges the operating condition of steam traps, that is, whether or not the steam traps are leaking steam, or measures the leakage of steam.

A steam trap is mounted on steam lines or
10 equipment using steam and permits the automatic removal of collected water without the leakage of steam. As a result of increasing cost of fuel, more and more strict demands are at present imposed on the monitoring of steam leaks. The avoidance of
15 steam leakage has now become a prerequisite for the employment of a steam trap. Steam pipelines, after installation, are strictly monitored; and a steam trap which is leaking steam is repaired or replaced forthwith.

20 There have been developed and put to practical use various types of steam trap leakage detectors.

For instance, a sight window is provided in the pipeline on the outlet side of the steam trap to allow the visual observation of the state of a fluid inside,
25 and also a temperature gauge and vibrometer are employed to measure the surface temperature of the steam trap and the sound caused by the fluid flowing through it.

In either case, the state of leakiness of the steam
30 trap was determined qualitatively only, and the quantitative measurement of leakage could not be made. Therefore, the judgement of the degree of leakage had to be dependent on the operator's insight.

35 It is accordingly an object of the present invention to provide simple steam trap leakage detectors.

One of the known detectors is proposed in Japanese patent application no. 61-57499. That concerns an invention for determining steam
40 leakage on the basis of a correlation between vibrations by using a steam pressure as a parameter and the steam leakage that has been measured and stored in advance by placing a detector with built-in vibration and temperature sensors on the outside
45 surface of a casing of the steam trap.

Another device, proposed in Japanese patent application no. 61-56521, is disposed between the steam supply end and the steam trap, and the steam leakage is determined from a correlation between
50 the quantity of steam passing through an orifice and a water level on its primary side.

The aforementioned device is capable of judging the operation of each steam trap and measuring steam leakage, but cumbersome manual operation
55 is required for the preparation of a list of results of operation judgement and leakage measurement, and for the summation of leakage and the totalization and analysis of leakage in terms of cost or rejection rate. In addition, repair or replacement of
60 a trap which leaks steam is carried out after checkups, and accordingly could not be positive maintenance of the steam traps.

The technical problem underlying the present invention therefore, is to enable the automatic
65 totalization and analysis of checkup data and the

prediction of a repair or replacement period.

To solve this problem, the present invention provides a device with which the operation of each trap is judged and the steam leakage is measured
70 and stored by means of a steam leakage detector; the aforesaid stored data are transmitted to a host computer, which records and displays a result of the judgement of the operation and leakage of each trap, summation and analysis of total leakage at all traps and the leakage in terms of cost or rejection rate, and
75 a change in each steam trap with time.

The function of the aforementioned technological means will be described below.

The judgement of the operation of each steam trap and the measurement of steam leakage are
80 performed by the steam leakage detector. A result of this judgement of the operation and measurement of leakage is once stored in the storage section of the steam leakage detector, and after the check of all
85 steam traps, the data stored are transmitted to the host computer.

The host computer records and displays a result of the judgement of the operation of, and leakage at, each steam trap, the necessary totalization and
90 analysis of the total leakage at all traps and the leakage in terms of cost and rejection rate, and a change in the leakage at each steam trap with time.

In this way, printing, totalization and analysis of a result of checkups can automatically and correctly be
95 carried out and accordingly the maintenance control of steam traps can easily be performed. Also, as the change of leakage with time is recorded and displayed, the time of repair or replacement can automatically be known by predetermining the time
100 of repair or replacement on the basis of leakage.

Manual operations for inputting into the computer can be saved by reading, with a bar-code reader, the trap number and type of each steam trap printed on a
bar-code provided on each steam trap.

105 The particular effect achieved with the present invention will now be elucidated.

Since the result of the checkups is automatically recorded, totalized and printed by the host computer, manual work can be dispensed with,
110 enabling work saving and standardization.

Furthermore, since changes in steam leakage at the steam trap with time are recorded and displayed, defective parts can be found and repaired or
115 replaced in good time, which can prevent the waste of production cost, and contribute toward energy saving.

One preferred embodiment according to the present invention will now be described, by way of example, with reference to the accompanying single
120 figure of the drawing.

Figure 1 is a schematic drawing showing the constitution of a steam trap operation judging device of the present invention.

The steam trap operation judging device of the present invention, as shown, comprises a steam leakage detector 1, an arithmetic display device 2
125 and a host computer 3.

A trap operation detecting section 10 is formed at one end of the detector 1 and a bar-code reader 11 at
130 the other end.

The bar-code reader 11 reads the trap number and type and inputs this data into a microcomputer 6 of the arithmetic display device 2. A signal received by the operation detecting section 10 is transmitted to the arithmetic display device 2 through a cable 12, amplified by an amplifier 4, digitally converted by an analog/digital converter 5, and then fed into the microcomputer 6.

The microcomputer 6 computes the presence or absence of leaks and the leakage, displays this data on the display section 7 and, at the same time, stores in a storage section 8 the data regarding the judgement of the number and type, operation, and leakage of each trap. After all steam traps have been checked, the measured data stored in the storage section 8 are sent from a data transmitter section 9 through a cable 13 to the host computer 3.

The host computer 3 records and displays the result of the judgement of the operation and leakage of each trap, the summation and analysis of the total leakage of all traps and leakage in terms of cost or rejection rate, and changes in each steam trap with time.

Although the present invention has been described by way of example with reference to the accompanying drawing, it is to be noted that various changes and modifications will be apparent to those skilled in the art, and that the protection claimed includes such changed and modified embodiment as are within the reach of the skilled worker without departing from the scope of the present invention.

CLAIMS

1. A steam trap operation judging device characterized in that the operation of each steam trap and steam leakage are measured and stored by a steam leakage detector; and the stored data are transferred to a host computer, which records and displays the summation of the leakage at all steam traps, the totalization and analysis of the leakage in terms of cost or rejection rate, and a change of each of said steam traps with time.

2. A steam trap operation judging device as claimed in claim 1, characterized in that a bar-code reader is mounted on said steam leakage detector, for reading the trap number and type of each steam trap.

3. A steam trap operation judging device substantially as described herein with reference to, and as shown in, the accompanying drawing.